More on ENUM

National Information Technology Center
ENUM Task Force

ENUM Classifications

ENUM Types

- **Public User ENUM**
  - ❖ **Does** require e164.arpa domain name resolving
  - ❖ For all end users
  - ❖ A service provider only provides connectivity services
  - ❖ Regulatory sets policies and regulations
  - ❖ Each user has his own ENUM number
- **Infrastructure ENUM**
  - ❖ **Does** require e164.arpa domain name resolving
  - ❖ Strictly for network operators and carriers
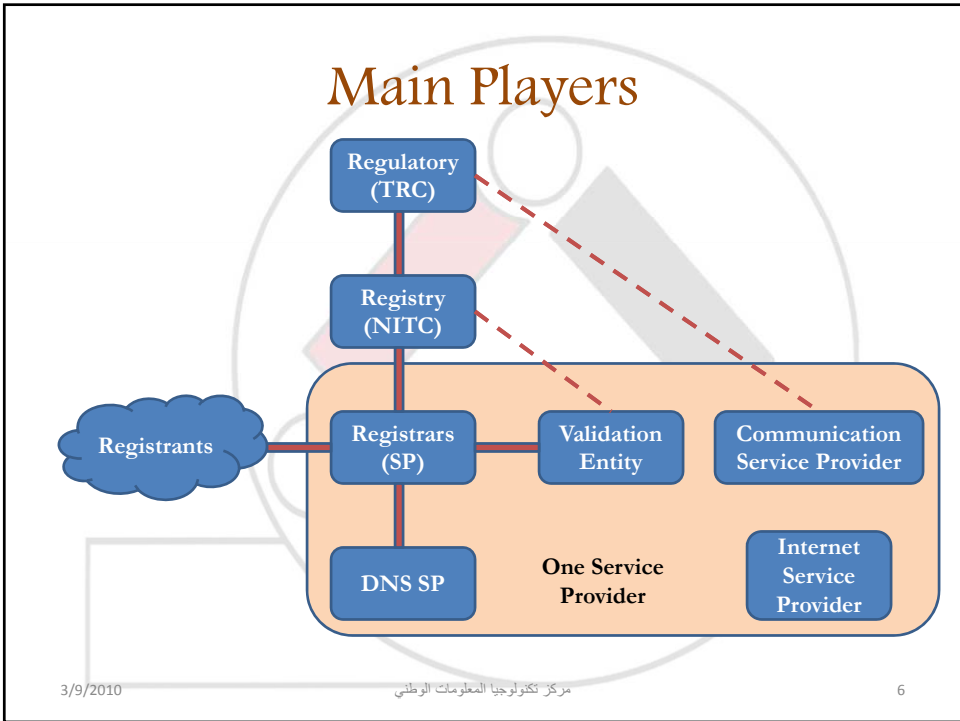 - ❖ Regulatory sets policies and regulations

… continue (ENUM Types)

- **Private User ENUM**
  - ❖ **Does not** require e164.arpa domain name resolving
  - ❖ Local within an organization, or shared between several distributed organization
  - ❖ Regulatory has no say regarding policies and regulations
  - ❖ Also called "*Operator ENUM*" or "*Enterprise ENUM*"
- **Federation ENUM**
  - ❖ Strictly for interconnection of service providers over IP
  - ❖ Regulatory has no say regarding policies and regulations (international rules apply)

ENUM Stakeholders and Players

Main Players

Regulatory (TRC)

Registry (NITC)

Registrants

Registrars (SP)

Validation Entity

Communication Service Provider

DNS SP

One Service Provider

Internet Service Provider

Telecommunication Regulatory

- Sets policies - together with the local community, e.g. Validation policy
- Accredits the "*Communication Service Provider*"
- Provides number allocation for the "*Communication Service Provider*"

Registry

- Acknowledges delegation request of country code (with *ITU* and *RIPE NCC*)
- Administrative owner of local ENUM zone
- Technical authority for local ENUM zone
- Provides DNS and registry services (Servers, WhoIS, Registration System, … etc)
- Works jointly with the *Regulatory*
- Accredits *Registrars*
- Accredits *Validation Entities*
- Has no direct contract with *Registrants* - Prohibited

Registrar

- Provides ENUM registration to customers (*Registrants*)
- Has contract with *Registry*
- Uses *Validation Entity* for validation
- Interacts with the registry ENUM system via EPP (*Extensible Provisioning Protocol*)

Validation Entity

- Performs actual validation
  - ❖ Is the *Registrant* the *Number Holder* ?
- Enforces validation policy
- Provides services to *Registrars*
- Accreditation must be provided by the *Registry*
- Could support various validation methods
- Could serve several registrars (*Validation Service Provider*)

Registrant (Number Owner)

- Owns an ENUM number; i.e. *Number Holder*
- Has right on respective ENUM domain (*Registrant*)
- Contracts a *Registrar* to register ENUM domain
- Needs to provide information for validation purposes
- Decides on points of contact and their priorities

Communication Service Provider

- Receives number allocation from *Regulatory*
- Usually accredited by *Regulatory*
- Assigns numbers to *Registrants* (number holders)
- Typically has authoritative number ownership information – in coordination with *Regulatory* under strict privacy
  - ❖ Useful for validation

DNS Service Provider

- The main target of DNS delegations from the *Registry*
- Hosts ENUM domains of *Registrant*
- Provides DNS zone provisioning interfaces (EPP with DNS server)
- DNS entries point to services of the *Service Provider*
- Needs to work together with *Registrar*

Internet Service Provider

- Mainly provides services such as hosting (web, mail, IM) and VoIP

ENUM Organization Patterns

- Led by an independent organization
  - ❖ Registry, Telecom Operator, Vendor, ISP, …
  - ❖ Austria, UK, Netherlands, Sweden, Japan, … (majority)
- Led by a ccTLD
  - ❖ ccTLD plays the leading role
  - ❖ Germany, S. Korea, Jordan
- Led by the regulatory
  - ❖ Telecommunication Regulatory Authority plays the leading role
  - ❖ China, Singapore

… continue (ENUM Org. Patterns)

- Led by a company entrusted by the regulatory
  - ❖ Private company plays the leading role
  - ❖ Armenia, Romania, Switzerland
- Led by an entrusted registry of another country
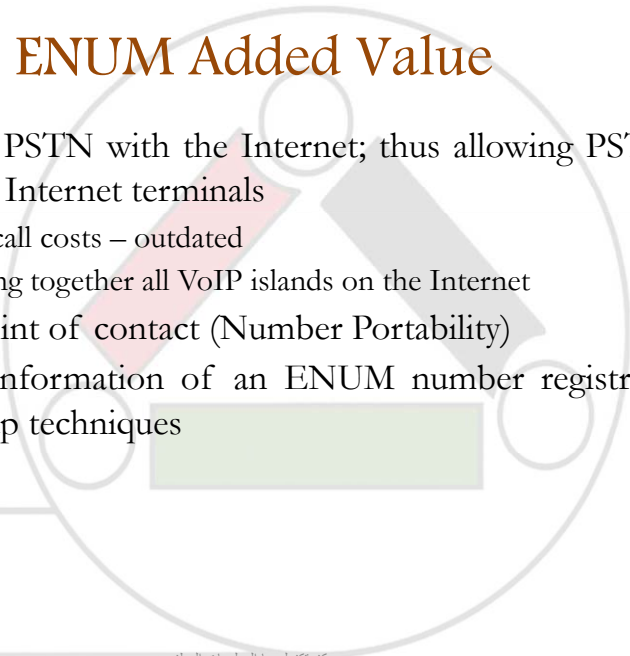 - ❖ Another country's ENUM switch plays the leading role
  - ❖ Lichtenstein

Added Value and Advantages

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ENUM Added Value

- Bridging PSTN with the Internet; thus allowing PSTN to access Internet terminals
  - ❖ Low call costs – outdated
  - ❖ Linking together all VoIP islands on the Internet
- Single point of contact (Number Portability)
- Extract information of an ENUM number registrant via lookup techniques

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Single Point of Contact

- For a call initiator to reach a recipient, the initiator can store one number (ENUM number)
- This single number could forward a call to a home land line, cell phone(s), work land line, IP phone, … depending on how you setup your ENUM zone file priorities
  - ❖ If initiator sends text, the text could arrive as SMS, fax, e-mail, or IM
- DNS is reliable, and easy to implement and understand

Low Call Costs

- The idea of ENUM came to live in 1998
  - ❖ Back then, the IETF and ITU were studying possibilities to reduce costs on calls – amongst other options
- ENUM came to life as a method to reduce costs of calls, but it required integration of PSTN with other voice technologies (SIP, H.323, … etc)
- This theory has been outdated!

Policy Issues to Consider

Issues to Consider

- How to authenticate the identity of the subscriber for ENUM services?
- Who are the ENUM registrars, and what are they responsible for?
- How to validate ENUM data for potential subscribers (Add – Modify – Delete) in the NAPTR list of services and preferences?
- How is data provisioned in the country code name servers?

… continue (Issues to Consider)

- How to obtain end-user agreement if necessary to enter a number in DNS?
- How to harden the ENUM zone data against data mining, especially for the purposes of spam and scamming?
- Competition models amongst suppliers of ENUM services, and related portability issues

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Subscriber Identity Authentication

- When a registrant requests a new ENUM number, what is the process? And what identification is required?
- Is registration requirements same for all sectors?

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ENUM Registrars

- How does registry choose them?
- Nature of agreements between registry and registrars
- Connection between registry servers and registrar servers

ENUM Data Validation

- Do the forwarding options (land line, cell phone, e-mail ID, fax, …) belong to the registrant?
  - ❖ **Land line** – Via regulatory
  - ❖ **Cell Phone** – Via regulatory
  - ❖ **SIP or H.323 Number** - Via regulatory
  - ❖ **Fax** - Via regulatory
  - ❖ **E-Mail** - ???
  - ❖ **Website** – Is it limited to personal websites? Or can I add any website (socially-rejected websites prohibited, but how)?
  - ❖ **Instant Messaging** - ???

Data Provisioning

- What data is stored for registry / registrar usage ONLY
- What data can be shown to the public (via WhoIS)?

End–User Agreement

- The nature of agreement between registrar and registrant
- Length of agreement
- Commitments of registrant to registrar and vice versa

ENUM Number Lookup Process

- Some registrars show content of zone file to the free world
  - ❖ Spam e-mail, scam calls, call re-routing, website hacking
- When looking up data for an ENUM domain, what should be visible to all?
- Can registrant decide what data to show and what data to hide?

ENUM Competition Models

- Is pricing unified amongst all registrants?
- Nature of royalty fee for registry
- Is accreditation required?
- Rules and conditions to become a registrar
- Are their any rules imposed on the number of registrars?
- Can the registrars have their say on the registry and local regulatory?

References

- http://rnd.domainregistry.my/home/enum-seminar-2009/1-ENUM-background-v2.pps
- http://cans2005.cstnet.cn/down/1102/A/morning/ENUM_in_China-CANS2005_4A.pdf
- http://rnd.domainregistry.my/home/resource/myENUM-implementation-at-testbed-phase-08082008.pps
- http://www.rtr.at/en/komp/ENUMKonsultation/RTR%20Consultation%20on%20ENUM.pdf
- http://www.cept.org/341F7EED-3020-47D9-AC76-208DF10A21A7?frames=no&

Questions?

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